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THE DISTRIBUTION OF ROTIFERA ON MOUNT DESERT ISLAND. PART II¹

NEW NOTOMMATIDAE OF THE GENERA *NOTOMMATA* AND *PROALES*

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Some years ago, Dr. Roy W. Miner, of The American Museum of Natural History, suggested to the writer that a study of the rotifers of Mount Desert Island, Maine, should be made. Investigation was accordingly started during the summer of 1921 and continued intermittently until 1932.

Although fieldwork is still in progress, so much material had accumulated that it seemed advisable to publish a preliminary report of all known species found on the Island (Myers, 1931). The species listed in this published report included nearly all the rotifers belonging to the central group of the Notommatidae previously described by Haring and Myers (1922, 1924, 1926, 1929).

Although at the time of the completion of Part IV of the 'Rotifer Fauna of Wisconsin' (Haring and Myers, 1929), it was thought that the majority of species belonging to the genus *Notommata* and other closely related groups had been found and described, further fieldwork on Mount Desert Island revealed an entirely unsuspected wealth of new rotifers belonging to many genera. Some of these new forms are described in this paper.

It should not be assumed that all of the new species herein described are endemic in any sense of the word. Many of the new rotifers collected by the above investigators (over one hundred in all) and originally found in acid-water associations of Wisconsin and New Jersey, have since been reported from abroad, and there is no doubt that many of the species, now considered to be rare, will eventually be shown to have a world-wide distribution.

It is evident that as yet we know only a fraction of the total number of rotatorian species extant. One reason for this is that permanent associations of acid water are not common where rotifers have hitherto been searched for most intensively. Many of the now common rotifers

¹Part I (not numbered) of this work appeared in 1931, American Museum Novitates, No. 494, pp. 1-12. It comprises a faunal list of the rotifers of Mount Desert Island.

were considered rare before acid-water associations were thoroughly investigated in this country.

As the hydrogen ion concentration of large bodies of water within an acid terrain is higher in the open reaches near the middle than in the shallower littoral region where aquatic plants are abundant, most of the acid-water rotifers are to be found within the six foot contour limit among submerged aquatic vegetation or evenly distributed in the relatively small and shallow waters of permanent acid-water associations.

The p_H of twenty-seven fresh-water locations, in which collections on Mount Desert Island were made, ranged from 6.0 to 6.8, in the littoral region. In the summer of 1927, the p_H of the shore region of Long Lake, the largest body of fresh water on the Island, was 6.6–6.8, while it registered 7.0–7.2 near the middle.

Paratypes of all available material herein described have been deposited in the collection of The American Museum of Natural History. Fourteen new species described in this paper are as follows:

<i>Notommata endoxa</i>	<i>Proales phaeopis</i>
<i>Notommata aethis</i>	<i>Proales adenodis</i>
<i>Notommata avena</i>	<i>Proales ornata</i>
<i>Notommata apochaeta</i>	<i>Proales granulosa</i>
<i>Notommata prodota</i>	<i>Proales bemata</i>
<i>Notommata fasciola</i>	<i>Proales gladia</i>
<i>Notommata rugosa</i>	<i>Proales macrura</i>

ORDER PLOIMA

Family Notommatidae

Notommata endoxa, new species

Figure 1

The body is slender and tapering; its greatest depth is about one-seventh of the total length. The integument is rather flexible, but the outline is quite constant.

The head is short and stout; there is a slight transverse skin fold just in front of the dorsal antenna, and a well-marked constriction separates the head from the abdomen. The trunk tapers gradually to the base of the toes. The tail is small and consists of one round lobe. The foot is very short and obscurely two-jointed. The toes are small and acute. From the dorsal view, they diminish suddenly from broad bases, ending in papillose tips.

The corona extends down the ventral side about one-fourth of the total length of the animal. The auricles are relatively small.

The dorsal and lateral antennae are minute setigerous papillae in the normal positions.

The mastax is of the virgate type, the trophi being robust and asymmetric. The fulcrum is long and stout, tapering gradually from the base to the posterior end. The posterior half of the fulcrum is Y-shaped in cross-section, appearing as two thin

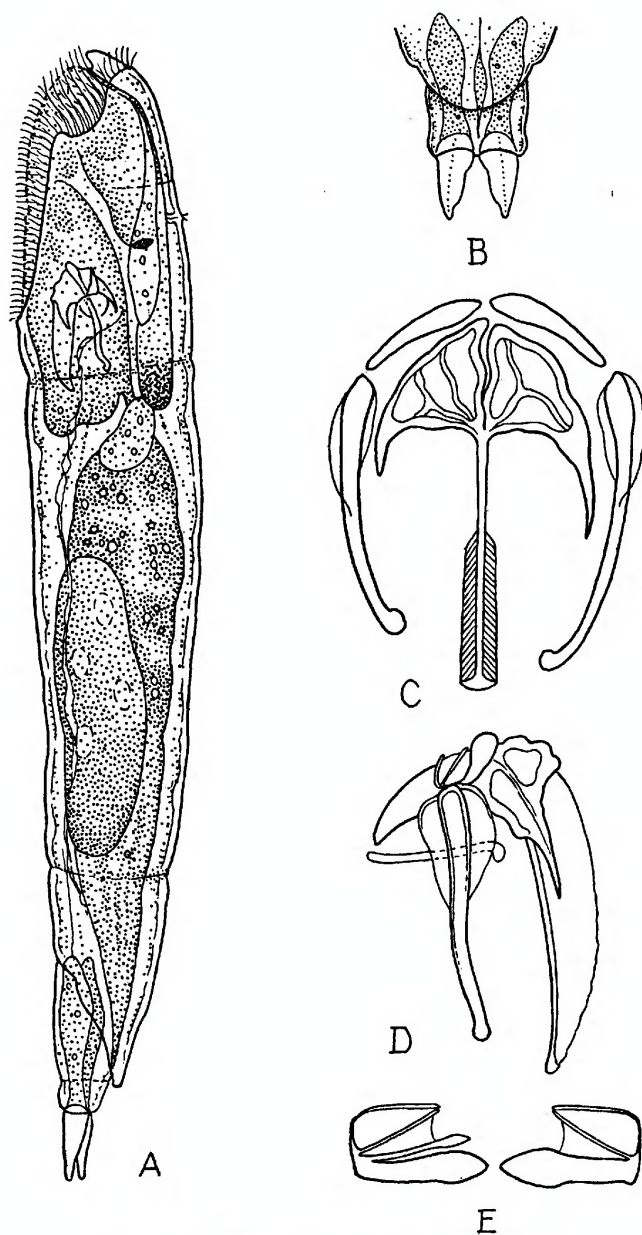


Fig. 1. *Notommata endoxa*, new species.

A, lateral view; B, toes, dorsal view; C, trophi, ventral view; D, trophi, lateral view; E, unci, frontal view.

lamellae gradually increasing in width, projecting diagonally outward, and providing increased surface for the attachment of the abductor muscles. The rami are irregularly triangular from the ventral view and are strongly curved longitudinally so that their posterior edge is nearly at a right angle with the fulcrum. The alulae are strongly developed, the left being larger than the right. The right uncus has a well-developed ventral tooth, clubbed near the tip, followed by a smaller and more slender tooth, arising from the base of the former; the basal plate is provided with two strengthening ribs. The left uncus has a very short opposing ventral tooth, followed by two strengthening ribs attached to a subsquare basal plate. The manubria are long and stout, the left manubrium being more robust and longer than the right. The lamellar basal portions are small and triangular; the posterior branches curve abruptly inward. Below the posterior edge of each ramus, a curved supporting rod is embedded in the walls of the mastax.

The gastric glands are small and reniform. The stomach and intestine are normal and the bladder is formed by an expansion of the cloaca. The foot glands are stout and slightly longer than the foot.

The retrocerebral sac is very long, and numerous bacteroids are clustered in the posterior portion. The retrocerebral duct is somewhat opaque and can be traced to the outlets on the corona. The subcerebral glands are slightly more than one-half the length of the retrocerebral sac. There is a large eyespot at the posterior end of the relatively small ganglion.

Total length, 530–650 μ ; toes, 30–40 μ ; trophi, 60 μ .

HABITAT.—Littoral fresh-water associations among submerged aquatic vegetation.

Notommata endoxa is one of the larger species of the genus. It seems to be widely distributed, although never in great numbers. It has been found sparingly on Mount Desert Island; in Polk County, Florida; Vilas County, Wisconsin; and Atlantic County, New Jersey. Its nearest relative is probably *Notommata pachyura* (Gosse). Both species have the same arrangement of the retrocerebral organs, although the sac is never clear in *Notommata endoxa*, as in the former species. The bladder is absent in both, and there is a general resemblance in the structure of the trophi. However, the shape of the body and the toes of these rotifers is quite different. A salient character of *Notommata pachyura* is the presence of a round, prominent, dorsal prolongation of the abdominal cuticle overhanging the foot, the so-called "tail." In *Notommata endoxa* this is small and normal.

***Notommata aethis*, new species**

Figure 2

The body is very long, slender, and cylindric; its greatest depth is about one-eighth of the total length. The cuticle is very flexible, and the outline varies considerably with the state of contraction.

There is no skin fold separating the head from the abdomen; instead, there are several elevations and depressions which roughly mark the anterior and posterior limits of the intestinal tract. The head is bluntly pointed anteriorly, and the corona

is extremely long. The buccal field is evenly ciliated and projects in the region around the mouth, giving the lateral view of the corona an angular appearance. The trunk is nearly parallel-sided, being only slightly gibbous over the lumbar region, whence it diminishes gradually to a long, cylindrical portion. The foot is very short and tubular. The toes are widely separated at the base. From the dorsal view, the outer edges are straight; the inner edges are also straight for nearly their entire length, then diminish abruptly and end in papillose tips.

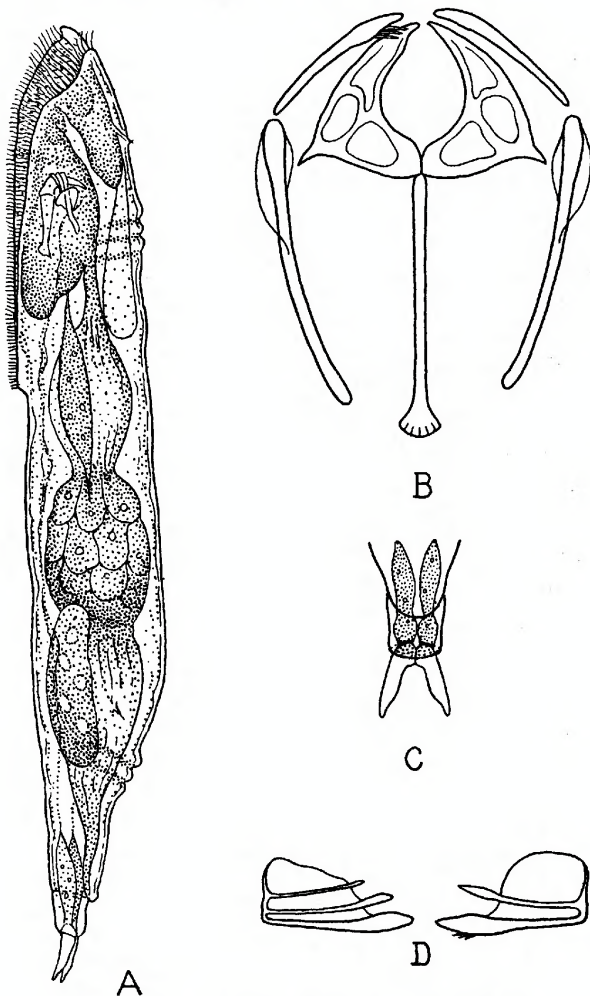


Fig. 2. *Notommata aethis*, new species.
A, lateral view; B, trophi, ventral view; C, toes, dorsal view; D, unci, frontal view.

The dorsal antenna is a minute, setigerous papilla. The lateral antennae are small tubules, from the tips of which emerge sensory seta.

The corona resembles that of the forcipate notommatids. It extends down the ventral side about two-fifths of the total length of the animal. The apical area is very

similar to the rostrum of many species of the genus *Dicranophorus*, but the ciliation of the circumapical band persists in this case. Laterally, there are two non-evertile, strongly ciliated arcs resembling auricles.

The mastax is of the virgate type. The fulcrum is long and slender, the posterior end being abruptly expanded. The rami are approximately triangular from the ventral view, and the dorsal portion is bent nearly at a right angle to the fulcrum; the inner margins are lyrate and without denticulation. The left uncus has a large ventral tooth, clubbed near the tip, to which three small, rodlike preuncial teeth are attached. The main tooth is followed, in turn, by one stout accessory. All are attached to a subsquare basal plate. The right uncus has a stout opposing ventral tooth, clubbed near the tip and followed by two more slender accessories. The manubria are broadly expanded anteriorly, the median branch continuing as a slight incurved rod.

The esophagus is very long, the posterior portion being expanded into a vast proventriculus. The gastric glands are large, elongate, and fusiform; they are attached to the wall of the mastax anteriorly and to the sides of the stomach posteriorly. The stomach and intestine are separated by a deep constriction. The ovary is small, and an expansion of the cloaca functions instead of a bladder. The foot glands extend forward for some distance beyond the foot.

The retrocerebral sac is very long and clear. There are no subcerebral glands, nor is an eyespot present.

Total length, 237–256 μ ; toes, 12–16 μ ; trophi, 25 μ .

HABITAT.—Submerged sphagnum in acid-water associations.

Notommata aethis occurs sparingly on Mount Desert Island and has also been collected in Atlantic County, New Jersey. It belongs to the *Notommata contorta-silpha-tithasa* group of species which are characterized by the aberrant structure of the corona; the auricles are replaced by non-evertile tufts of locomotor cilia, and the circumoral portion of the buccal plate is elevated, giving the lateral view a triangular appearance. In the main it differs from any of the above species in the absence of an eyespot—very unusual in the genus *Notommata*—and in the structure of the alimentary tract.

***Notommata avena*, new species**

Figure 3

The body is cylindric and rather slender; its greatest width is somewhat less than one-fifth of the total length. This rotifer is very transparent, and the outline varies considerably with the state of contraction.

The skin folds limiting the neck are well marked. The trunk increases gradually in depth for about two-thirds of its length, whence it tapers rapidly to the tail which has one round lobe. The foot has two joints of about equal length. The toes are long, slender, and almost straight.

The dorsal antenna is a small setigerous papilla. The lateral antennae are prominent tubules, from the tips of which emerge long sensory seta.

The corona is of the normal *Notommata* type. The auricles are relatively small and carry moderately long cilia which are not continuous with the circumapical band.

The mastax is aberrant. All the elements are delicate and slender, the pumping action being correspondingly weak. The fulcrum is short and straight, having no enlargement of the posterior end. The rami are lyrate from the ventral view, and the dorsal portion is produced as an arc of a circle. Each uncus has one clubbed tooth. Each manubrium is reduced to a curved, rodlike cell, the base of which is

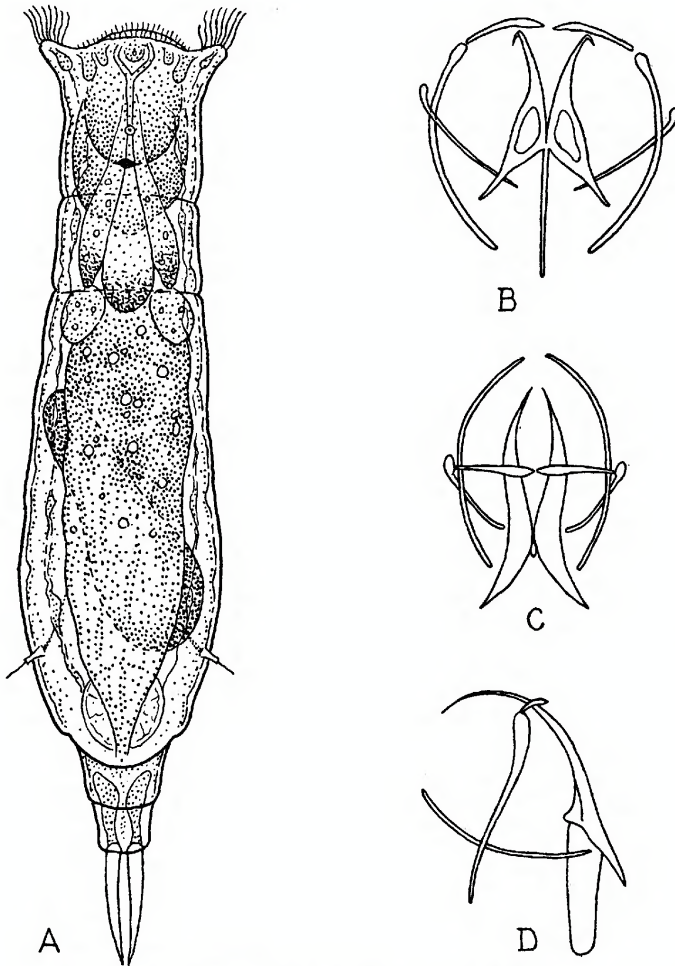


Fig. 3. *Notommata avena*, new species.

A, dorsal view; B, trophi, ventral view; C, trophi, frontal view; D, trophi, lateral view.

slightly swollen. A pair of slender supporting rods passes under the manubria and terminates beneath the dorsal tips of the rami.

The stomach and intestine are not distinctly separated from each other. The gastric glands are small and oval. The ovary and bladder are normal. The foot glands are small.

The retrocerebral sac and subcerebral glands are long and pyriform; their distal ends are crowded with bacteroids, and the duct can be traced to the openings on the corona. The small eyespot is situated at the posterior end of the ganglion.

Total length, 340–365 μ ; toes, 40–45 μ .

HABITAT.—Submerged sphagnum in acid-water associations.

Notommata avena was collected in small numbers on Mount Desert Island. It has also been found on rare occasions in Atlantic County, New Jersey. The highly modified mastax bears a strong resemblance to certain species of the genus *Monommata*—especially *Monommata enedra* Myers—thus indicating their common ancestry.

In describing a new species, a group should not be split up into so many genera as to make each one absolutely homogenous. A monotypic genus should not be proposed unless a certain departure is very striking. If, however, the same modification occurs in several species, which in other respects are closely related, a new generic name should be introduced.

While the mastax of *Notommata avena* is aberrant, the animal agrees so well with the normal in other respects that it does not seem advisable to propose a new genus until more is known regarding its affinities.

***Notommata apochaeta*, new species**

Figure 4

The body is cylindric and rather stout; its greatest depth is about one-fifth of the total length. The integument is flexible, but the outline remains constant, and the general shape is well retained at all times.

The head is long and the transverse fold, separating it from the abdomen, is well marked. The trunk is nearly parallel-sided. The tail is small and round. The foot is short and obscurely two-jointed. The toes are very small and conical.

The buccal plate extends down the ventral side for about one-third the total length of the animal. The auricles are small, and the marginal ciliation of the corona is continuous.

The dorsal and lateral antennae are minute setigerous papillae in the normal positions.

The mastax is of the virgate type. The fulcrum is long and slender; it expands gradually toward the posterior end which is serrate. The rami are without inner marginal teeth, and the dorsal portion is bent nearly at a right angle to the fulcrum. The right uncus has a very stout ventral tooth, clubbed near the tip; a rudimentary tooth is attached to its ventral side midway between the base and the tip. Following this are three slender accessories, decreasing in length and attached to a subsquare basal plate. The left uncus has a stout, slightly curved, opposing tooth, clubbed near the tip; this is followed by three accessories, also attached to a subsquare basal plate. The median branch of each manubrium is stout and curved dorsally near the tip; the basal plate is large and irregularly triangular in shape.

The gastric glands are small and subcircular. There is no constriction between the stomach and the intestine. The ovary is small and the bladder normal in size. The foot glands are nearly equal to the foot in length.

The ductless retrocerebral sac is round and clear. There are no subcerebral glands. The ganglion is large, and a round eyespot is attached to its posterior end.

Total length, 200–212 μ ; toes, 10–12 μ ; trophi, 34 μ .

HABITAT.—Submerged sphagnum in permanent bodies of acid water.

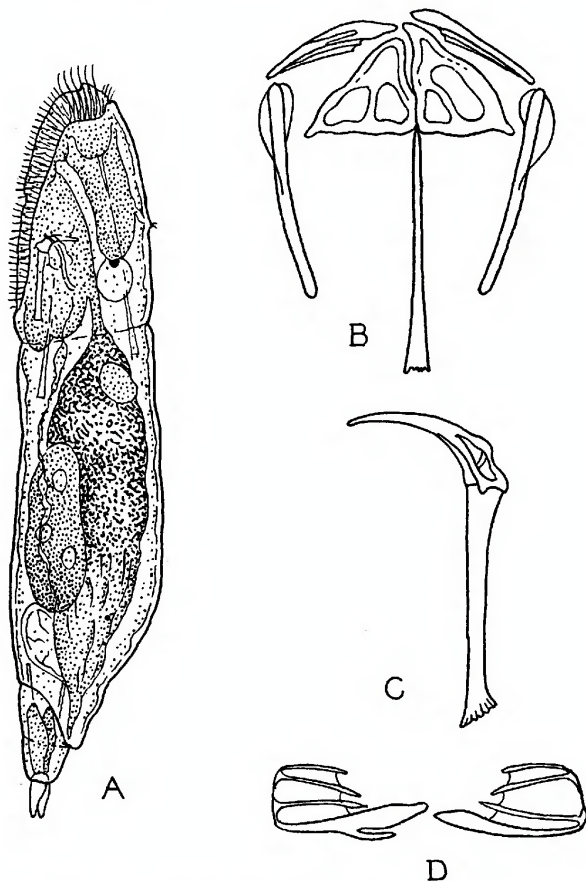


Fig. 4. *Notommata apochaeta*, new species.

A, lateral view; B, trophi, ventral view; C, incus, lateral view; D, unci, frontal view.

Notommata apochaeta is fairly common in the littoral region of lakes and ponds on Mount Desert Island. It has also been found in Atlantic County, New Jersey and Vilas County, Wisconsin. It is related to *Notommata aurita* (Müller), but differs from that species in that it is much smaller, lacks the subcerebral glands, and has very different trophi.

Notommata prodota, new species

Figure 5

The body is very slender and elongate; its greatest depth is somewhat more than one-sixth of the total length. The integument is very flexible, and the outline is constantly changing with the state of contraction.

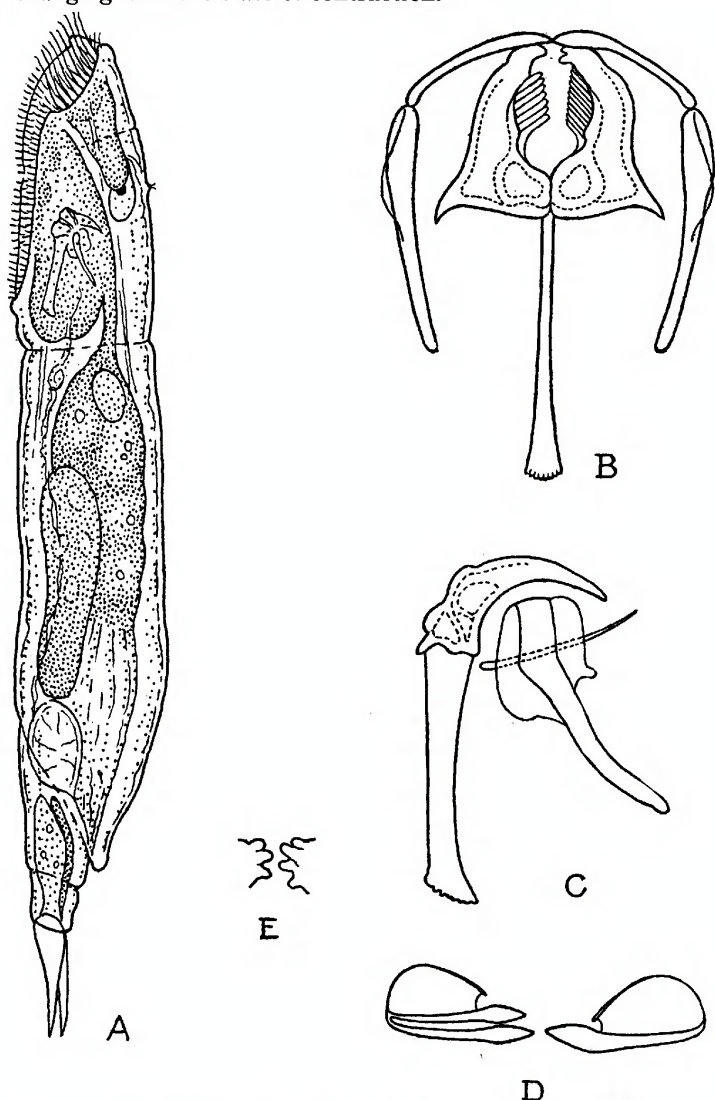


Fig. 5. *Notommata prodota*, new species.

A, lateral view; B, trophi, ventral view; C, trophi, lateral view; D, unci, frontal view; E, apical teeth.

The head is relatively small, and there is a slight skin fold just in front of the dorsal antenna; a second, deeper fold divides the head from the abdomen. The trunk is cylindrical for nearly its entire length. The tail is small and has one round

lobe. The foot has two short joints. The toes are conical, ending in prolonged tips; the dorsal edges are straight and the ventral edges concave.

The dorsal and lateral antennae are minute setigerous papillae in the normal positions.

The corona is normal and extends down the ventral side about one-third the length of the body.

The mastax is of the virgate type. The fulcrum is long and gradually expands toward the posterior end which is wide and serrate. The rami are triangular from the ventral view, and the dorsal portion is bent abruptly at a right angle. At the apex of the right ramus there are three blunt teeth; the apex of the left bears four. Above the oral opening, on the ventral side, the right ramus carries a denticulate comb of seven or eight blunt teeth. The left ramus carries an opposing comb of numerous smaller teeth. The right uncus has two large subequal teeth, clubbed near the tips; the left uncus has one large tooth, also clubbed near the tip. Each manubrium is stout, and the median branch has a sharp change of direction at a point one-fourth of the distance from the base; from that point it curves slightly dorsad. The basal plate is subsquare and carries a blunt, toothlike process on the dorsal side. A thin pair of supporting rods passes under the manubria and terminates below the tips of the rami.

The esophagus is long and slender. The gastric glands are very small and oval. There is only a slight constriction between the stomach and the intestine. The bladder and ovary are normal. The foot glands are long, stout, and club-shaped.

The retrocerebral sac is small and clear; there are no subcerebral glands. The ganglion is relatively small, and the eyespot is situated at its posterior end.

Total length, 355 μ ; toes, 35 μ .

HABITAT.—Submerged aquatic vegetation in acid-water associations.

Notommata prodota is evidently rare. A few specimens were collected in Round Pond during the summer of 1924. The trophi, together with the unusual toes, readily suffice to separate this species from any other in the genus.

***Notommata fasciola*, new species**

Figure 6

The body is cylindric and very slender; its greatest depth is about one-seventh of the total length. The integument is flexible, but the outline remains quite constant.

The head is large and separated from the abdomen by a well-marked constriction. The trunk decreases gradually in depth from just back of the neck fold to the base of the foot. The tail is quite small and is composed of a single round lobe. The basal joint of the foot is short and stout; the terminal joint, very long and transversely wrinkled. The toes are compressed and parallel-sided from the dorsal view; they are stout and lanceolate from the lateral view.

The dorsal and lateral antennae are minute setigerous papillae in the normal positions.

The corona is prone and has two lateral ciliated areas corresponding to auricles, but not evertile. The buccal field is large, evenly ciliated, and projects strongly in the region around the mouth, giving the lateral view of the corona an angular appearance.

The mastax is of the virgate type. The fulcrum is a long slender plate with no posterior enlargement. The rami are triangular from the ventral view. About midway of their length they are bent at right angles to the fulcrum and are without inner marginal teeth or other irregularities. The right uncus has three, and the left uncus four teeth, clubbed near their tips. The manubria are nearly straight and equally developed. The anterior lamellar portion is expanded and subsquare; the median branch is stout and slightly recurved near the posterior end.

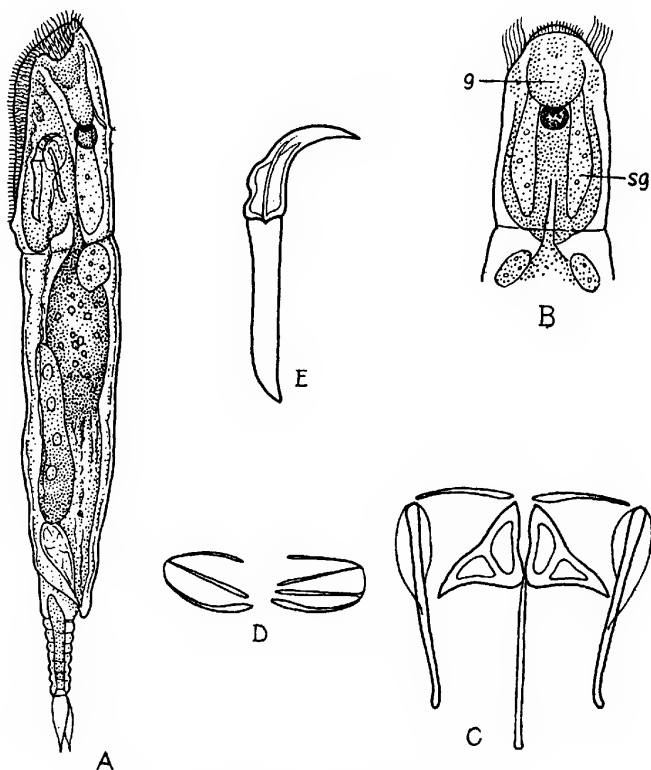


Fig. 6. *Notommata fasciola*, new species.

A, lateral view. B, head, dorsal view: *g*, ganglion; *sg*, subcerebral glands. C, trophi, ventral view; D, unci, frontal view; E, incus, lateral view.

The gastric glands are small and oval. The stomach is separated from the clear intestine by a shallow constriction. The ovary and bladder are normal. The foot glands are long and slender, extending almost to the base of the foot.

The retrocerebral sac is small, round, and ductless; it is frequently crowded with bacteroids. The subcerebral glands are very long and arise from the posterior end of the ganglion, one on each side of the retrocerebral sac. The ganglion is small and carries the eyespot at its posterior end.

Total length, 163–175 μ ; toes, 13–16 μ .

HABITAT.—Submerged sphagnum in acid-water associations.

Notommata fasciola is not uncommon on Mount Desert Island; Atlantic County, New Jersey; and Vilas County, Wisconsin. The trophi resemble those of *Notommata pseudocerebrus* De Beauchamp. The rotifer belongs, however, to that group, within the genus *Notommata*, that has a diglenoid type of trophi. This character, the pendant subcerebral glands, the wrinkled foot, and the elements of the trophi, are sufficient to separate this species from any other member of the genus.

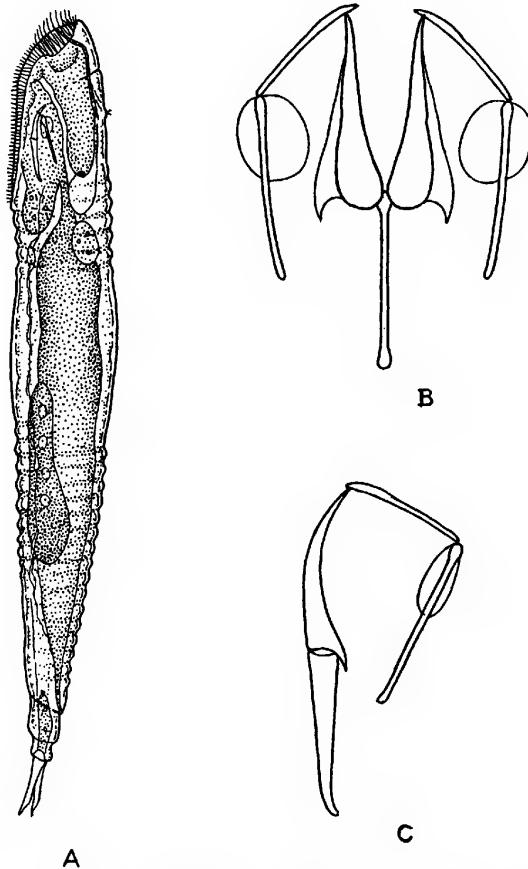


Fig. 7. *Notommata rugosa*, new species.
A, lateral view; B, trophi, ventral view; C, trophi, lateral view.

***Notommata rugosa*, new species**

Figure 7

The body is elongate, tapering, and very slender; its greatest depth is only about one-seventh of the total length. The integument is very flexible, and the outline is constantly changing with the contortions of the individual.

The head is short and narrow, and there is a skin fold just in front of the dorsal antenna. Instead of the usual constriction there is a series of elevations and depressions limiting the head posteriorly. The abdomen is nearly cylindrical and is also limited by a series of elevations and depressions, extending from the level of the ovary to the base of the minute tail. The foot is short and has two joints, the ultimate being much shorter than the basal. The toes are very slender; the bases are somewhat enlarged and then taper gradually to minute papillose tips.

The dorsal antenna is a small setigerous papilla; the lateral antennae were not observed.

The corona is nearly ventral and consists of a simple evenly ciliated area with non-evertile lateral tufts of strong cilia adapted for propulsion.

The mastax is a modification of the virgate type, prehension being the primary function and suction secondary. The fulcrum is long, slender, and tapering. The rami are roughly triangular from the ventral view and have large symmetrical alulae. Each uncus has one long slender tooth, slightly clubbed near the tip. The basal plate of each manubrium is rather large and round; the central branch is a long straight rod. The salivary glands are very large and uniform in size.

The gastric glands are small and oval. There is no distinct separation between the stomach and the intestine. The foot glands are small and slender.

The rectocerebral sac is clear and nearly spherical, its duct being traceable to the outlets on the corona. There is a minute eyespot situated at the posterior end of the long ganglion.

Total length, 180 μ ; toes, 15 μ .

HABITAT.—Submerged sphagnum in lofty acid-water associations.

Notommata rugosa is evidently rare. A few specimens were collected during the summer of 1927 in Jordan Mountain Pond, a small body of permanent water (elevation about eleven hundred feet), situated in a rocky declivity between the summits of Jordan and Sargent mountains. The species is intermediate between the genera *Notommata* and *Pleurotrocha*, partaking of the characters of both. It is placed in the genus *Notommata* provisionally, on account of the prone corona, the position of the mouth opening, and the presence of a retrocerebral sac. The salivary glands, the trophi, and the presence of only one tooth in each uncus, together with the nearly straight incus, are evidences of its affinities with *Pleurotrocha*.

***Proales phaeopsis*, new species**

Figure 8

The body is elongate, fusiform, and slender; its greatest width is about one-fifth of the total length. The integument is soft and flexible, and the rotifer is very transparent.

The head is marked off from the trunk by a well-defined neck constriction. The abdomen is widest just behind the neck, whence it gradually tapers to the toes. There are several obscure skin folds on the posterior portion of the abdomen. The foot is

short and has only one joint. The toes are conical and stout; they diminish suddenly to rather blunt, outcurved tips.

The dorsal antenna is a minute setigerous papilla; the lateral antennae were not observed.

The corona is nearly frontal. The ciliation of the buccal field is short and dense; it does not extend ventrally beyond the mouth.

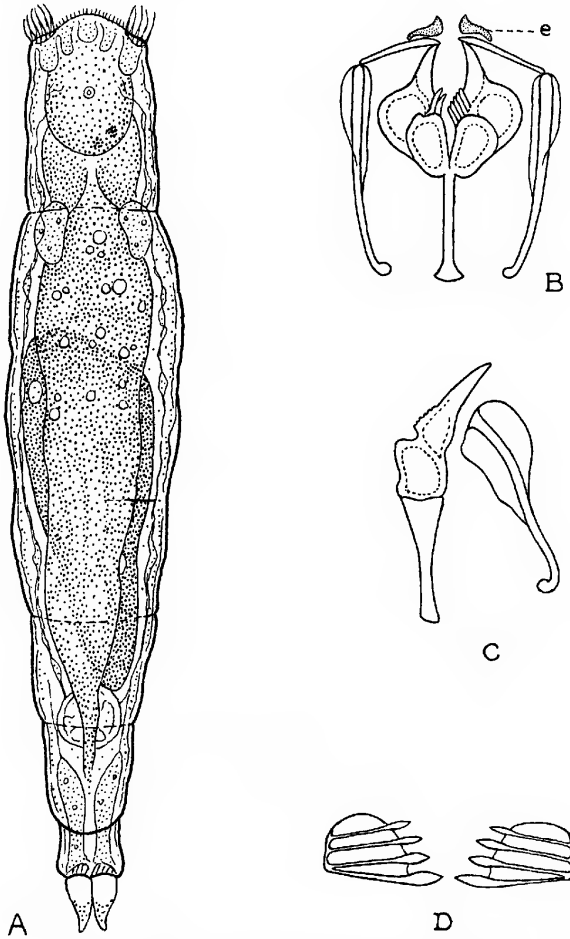


Fig. 8. *Proales phaeopis*, new species.

A, dorsal view. B, trophi, ventral oblique view: e, epipharynx. C, incus and manubrium, lateral view; D, unci, frontal view.

The mastax is a modification of the malleate type; it has a pair of large, confluent salivary glands arising from the posterior portion of the lateral lobes. The incus is nearly straight; the fulcrum is stout and terminates in a fanlike enlargement. The rami have prominent basal apophyses. Near midlength, the right ramus has two stout teeth, and the left ramus has a comblike plate of five slender, appressed teeth. Each uncus has five long teeth, clubbed near their tips; they gradually decrease in

length and size dorsally and are attached to a subcircular basal plate. The anterior portions of the manubria are broadly expanded, the lateral branches being one-half the length of the median branch, the posterior tip of which suddenly curves toward the ventral side and ends in a knoblike expansion. In front of the rami are two epipharyngeal rods of irregular shape.

The gastric glands are very small and reniform. The stomach is not sharply marked off from the clear intestine. The ovary is very large and pyriform. The foot glands are long and stout.

There is no trace of a rectocerebral sac. The eyespot is situated on the ganglion, somewhat forward and to the right of the median line. Just below the main eyespot and somewhat nearer the median line is a smaller, secondary eyespot.

Total length, 340 μ ; toes, 20 μ .

HABITAT.—Submerged aquatic vegetation in small bodies of permanent acid water.

Proales phaeopis is evidently rare. A few specimens were found in several locations during the summer of 1926. It somewhat resembles *Proales sordida* Gosse. The presence of a secondary eyespot, the differences in the trophi, and the absence of a dorsal spur at the base of the toes clearly distinguish it from that species.

***Proales adenodis*, new species**

Figure 9

The body is elongate, fusiform, and slender; its greatest width is just behind the neck constriction, a condition produced by the very large gastric glands. The entire body is very hyaline and flexible, varying greatly in shape with the contortions of the individual.

The head is relatively small and has a characteristic swelling of the dorsal portion over the ganglion. The neck is sharply marked off by a deep constriction. The abdomen tapers gradually to the base of the toes. The foot is very long and continuous with the general outline of the body; it is composed of two joints. The toes are short and acute; they have bulbous bases, and there is a septum dividing the abruptly reduced tips from the basal portion.

The dorsal antenna is situated at the apex of the characteristic swelling of the head; the lateral antennae were not observed.

The corona is normal; it does not extend ventrally beyond the mouth.

The mastax is a modification of the malleate type and is relatively very small. The incus is nearly straight, indicating a weak pumping action. The fulcrum is robust and terminates in a fanlike enlargement. The rami have large basal apophyses; near midlength the right ramus has two blunt teeth and the left, one. The dorsal ends of the rami are pointed and also act as teeth. There are five well-developed, gradually diminishing teeth in each uncus, all united by a weblike plate. The manubria are long and stout. In front of the rami are two epipharyngeal pieces of irregular shape.

The gastric glands are very large and prominent, giving the portion of the trunk opposite them a swollen appearance. The stomach is not sharply separated from the intestine. The ovary is relatively small and the bladder is normal. The foot glands

are very long, extending forward a little beyond the anal skin fold; to the base of each is attached a small pair of rudimentary glands.

The ganglion is long and saccate. There are indications of a reduced retrocerebral sac, and portions of the duct can be traced forward for some distance. The eyespot is situated on the ganglion and is placed to the right of the median line. There are traces of an accessory eyespot slightly to the left and below the main eyespot.

Total length, 290 μ ; toes, 15 μ .

HABITAT.—Among aquatic vegetation in acid-water associations.

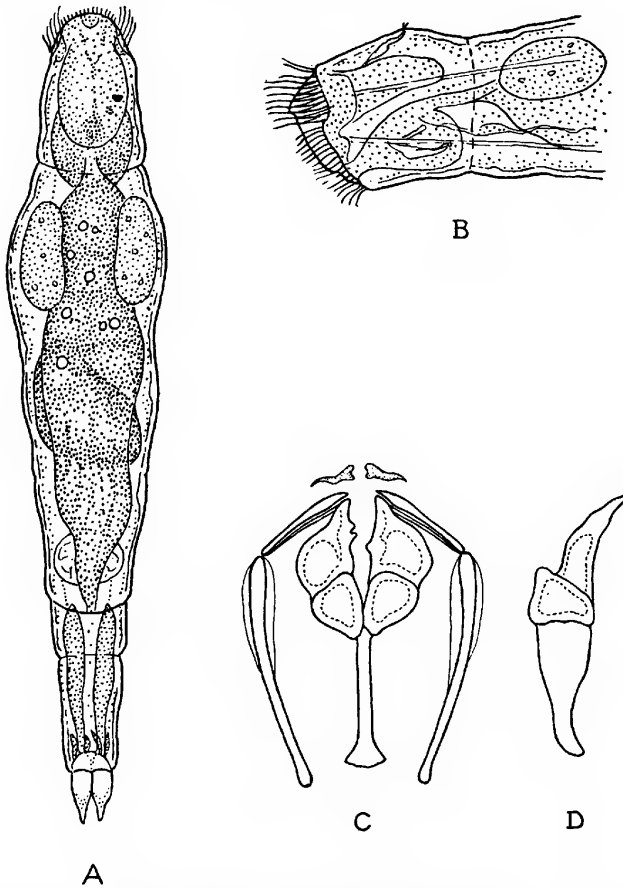


Fig. 9. *Proales adenodis*, new species.

A, dorsal view; B, head, lateral view; C, trophi, ventral view; D, incus, lateral view.

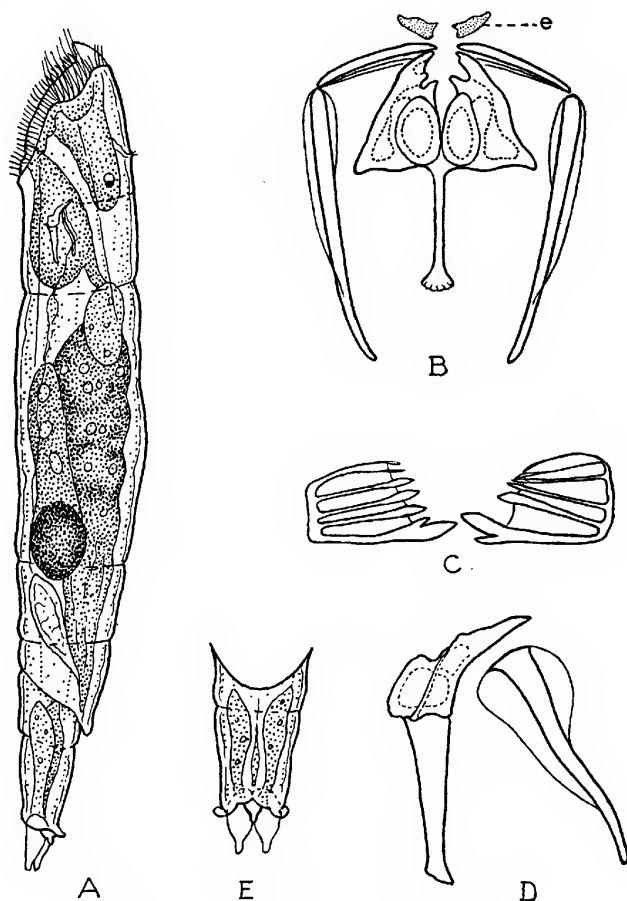
Proales adenodis was collected in small numbers in the Witch Hole and Long Lake. It bears a certain resemblance to *Proales phaeopis* Myers, being almost as large. It differs, however, in having much larger gastric glands, a much longer foot and glands, in the presence of a rudimentary retrocerebral sac, and in the different trophi.

***Proales ornata*, new species**

Figure 10

The body is elongate, slender, and fusiform; its greatest depth is about one-sixth of the total length. While the integument is soft and flexible, the general outline is quite constant.

The head is relatively long and pointed; the apex is in the form of a bare cuticular area limited posteriorly by a skin fold. It resembles the rostral process of the forci-

Fig. 10. *Proales ornata*, new species.

A, lateral view. B, trophi, ventral view: e, epipharynx. C, unci, frontal view; D, incus and manubrium, lateral view; E, toes, dorsal view.

pate notommatids. The neck constriction is well marked. The trunk is cylindrical and tapers gradually to the foot. There are two abdominal skin folds: one opposite the level of the posterior portion of the ovary, the other just in front of the anal skin fold. The foot is very long, and the terminal joint is about twice the length of the basal. The toes are short and stout, expanded at the base, then diminishing suddenly

and ending in blunt tips. Between the toes, at their base, and situated on the dorsal side, is a prominent, bulbous process surmounted by a minute papilla. On each dorsolateral side of the foot at its posterior end is a spurlike, cuticular process which is very characteristic and not present in any other species of the genus.

The dorsal antenna is a minute setigerous papilla; the lateral antennae were not observed.

The corona is very oblique, and the ciliation of the buccal field extends only a short distance beyond the mouth.

The mastax is a modification of the malleate type. The incus is not so straight as in some of the other species of the genus, but is more inclined dorsally. The fulcrum is long and terminates in a fanlike enlargement. The rami have large basal apophyses and, near midlength on the inner side, each ramus bears a strong blunt tooth. The dorsal ends of the rami are pointed and also act as teeth. The right uncus has six teeth; the first, or ventral tooth, is stout, bifurcate and clubbed near the tip; it is followed by three lesser, and two excessively slender accessories, all united by a lamellar plate. The left uncus has a very stout, bifurcate, ventral tooth, clubbed near the tip, followed by five teeth that gradually diminish in size, the last two being rudimentary. The manubria are long and nearly straight; the ventral branch is about three-fourths the length of the median branch; the dorsal branch is much shorter. In front of the rami are two epipharyngeal plates of irregular shape.

The gastric glands, stomach, ovary, and intestine are normal.

The ganglion is long. The eyespot consists of a globule of high refractive index, to the posterior portion of which is attached a disc of red pigment; it is situated on the ganglion some distance forward and to the right of the median line. There are no indications of a retrocerebral sac.

Total length, 254–278 μ ; toes, 14–18 μ ; trophi, 35 μ .

HABITAT.—Submerged sphagnum in permanent bodies of acid water.

Proales ornata is not common. A few scattered individuals were found during the summers of 1924–1931, inclusive. While it bears a superficial resemblance to *Proales decipiens* (Ehrenberg), the foot and toes are so characteristic that it cannot be mistaken for any other species of the genus.

***Proales granulosa*, new species**

Figure 11

The body is elongate and tapering. The outline is quite constant and is characterized by the lateral swellings produced by the very large gastric glands.

The head is small and not limited by a neck fold of the cuticle. The trunk gradually diminishes in breadth from opposite the gastric glands to the toes. The stomach is separated from the clear intestine by a shallow constriction. The foot continues the general outline of the body and is composed of two joints. The posterior portion of the terminal joint is divided, giving the short toes an appearance of being twice as long as they actually are.

The dorsal antenna is minute; the lateral antennae were not observed.

The buccal field is covered with short, densely set cilia, and the mouth is near the ventral edge.

The mastax is a modification of the malleate type. The incus is nearly straight. The fulcrum is quite long and tapers from a broad base to a fanlike posterior enlargement. The rami are lyrate from the ventral view, and have prominent basal apophyses. The alulae are large, excessively thin, lunate plates. Each ramus has two similar teeth, clubbed near their tips, and united by a weblike basal plate. The manubria are long and strongly incurved. In front of the rami are two small epipharyngeal pieces of irregular shape.

The gastric glands are very large and granulose; they contain central clusters of clear vacuoles. The walls of the stomach of the adult female are crowded with minute

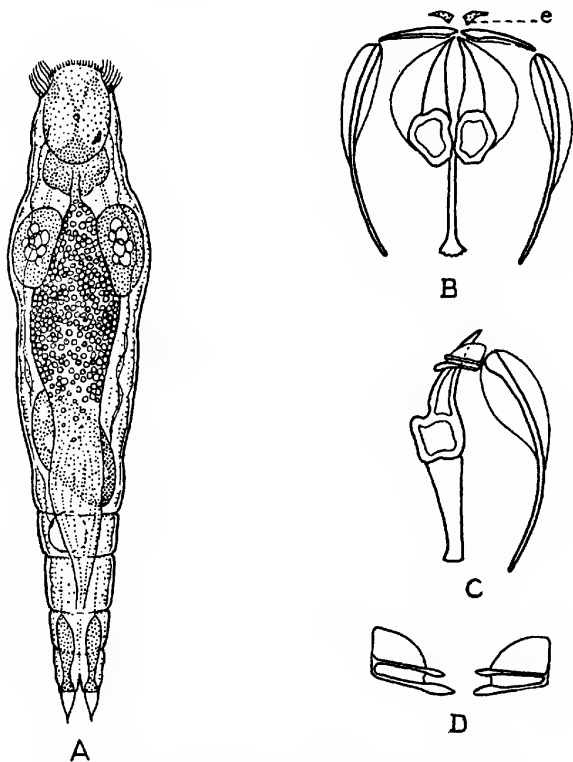


Fig. 11. *Proales granulosa*, new species.

A, dorsal view. B, trophi, ventral view: e, epipharynx. C, trophi, lateral view; D, unci, frontal view.

algae, and there is a shallow constriction separating it from the intestine. The foot glands are equal to the foot in length.

The ganglion is large and saccate. There is a rudimentary retrocerebral sac composed of small granules and indications of a duct leading to the outlets on the corona. The eyespot is situated on the ganglion somewhat forward and to the right of the median line.

Total length, 140 μ ; toes, 6 μ .

HABITAT.—Submerged sphagnum in acid-water associations.

Proales granulosa is well distributed on Mount Desert Island and throughout Atlantic County, New Jersey. It belongs to a small assemblage of species somewhat resembling *Proales decipiens* (Ehrenberg), but differs from any of them in the shape of the toes, the rudimentary retrocerebral sac, the trophi, and the unusual gastric glands.

***Proales bemata*, new species**

Figure 12

The body is tapering and cylindrical; it is divided into three nearly equal parts: the head, trunk, and foot. The integument is very soft and flexible, and the general shape varies considerably with the state of contraction.

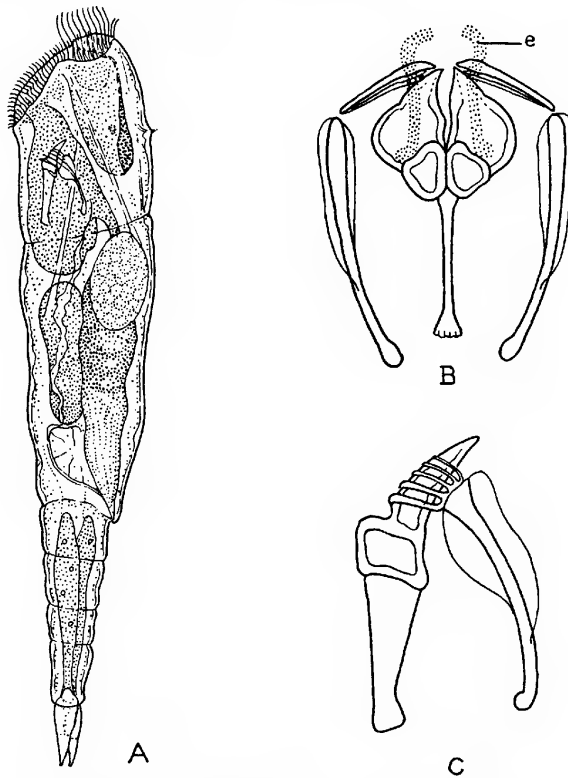


Fig. 12. *Proales bemata*, new species.

A, lateral view. B, trophi, ventral view: e, epipharynx. C, trophi, lateral view.

The head is large and separated from the abdomen by a well-marked neck constriction. The trunk tapers gradually to the foot, which is very long and four-jointed. The toes are short and acute; the anterior portions are slightly swollen, and a septum divides the tips from the basal portion.

The dorsal antenna is a minute setigerous papilla; the lateral antennae were not observed.

The corona is oblique. The ciliation does not extend ventrally beyond the mouth, which is situated at the lower edge of the buccal field.

The mastax is a modification of the malleate type. The incus is nearly straight. The fulcrum is long and is terminated by a fanlike enlargement. The rami have large basal apophyses, and there are no indications of internal denticulation beyond a slight swelling of the right ramus near midlength. Each uncus has five gradually diminishing teeth, clubbed near the tips. The median branch of each manubrium is prolonged posteriorly as a rather stout incurved rod, knobbed at the tip. In front of the rami are two elongate, irregular epipharyngeal rods.

The gastric glands are very large and vacuolated. The stomach, intestine, ovary, and bladder are all small. The foot glands are very stout and long, extending forward nearly as far as the anal skin fold.

There is a small, confluent retrocerebral sac crowded with bacteroids and attached to the dorsal side of the ganglion; the duct can be traced to the outlets on the corona. The eyespot is situated somewhat forward on the ganglion and to the right of the median line.

Total length, 132–145 μ ; toes, 12–15 μ ; trophi, 25 μ .

HABITAT.—Submerged aquatic vegetation in acid-water associations.

Proales bemata occurs in small numbers on Mount Desert Island and in Atlantic County, New Jersey. It does not bear much resemblance to any other species of the genus. The black retrocerebral sac should not be regarded as abnormal: all specimens of *Proales decipiens* Ehrenberg, from the Potomac River, had black, opaque sacs. The general shape, the large, vacuolated gastric glands, together with the differences in the trophi, readily separate this species from any other of the genus.

***Proales gladia*, new species**

Figure 13

The body is elongate, vermiform, and nearly parallel-sided, diminishing very gradually to the base of the toes. There is no constriction separating the neck from the trunk.

The abdomen is nearly cylindrical. The foot is short and continuous with the body outline; it has only one joint. The toes are rather slender and undulate, ending in acute, slightly recurved tips.

The dorsal antenna is a minute setigerous papilla; no lateral antennae could be found.

The corona is prone. The dorsal arc of the circumapical band has entirely disappeared.

The mastax is a modification of the malleate type, and the trophi are somewhat asymmetric. The fulcrum is a short lamellar plate. The rami have prominent basal apophyses, and the alulae are very unequally developed: the right being short and blunt; the left, long, triangular, and acutely pointed. Near midlength, the right ramus carries a blunt tooth; the dorsal portion of the left ramus carries three short teeth. The right uncus has three strong teeth, clubbed near the tips; the left uncus has two. The manubria are unequally developed, the left being much longer than the right; the ends of both are sharply incurved and end in knoblike tips.

The esophagus is extremely short, being virtually confluent with the stomach, which, in turn, is separated from the intestine by a deep constriction. The gastric glands, bladder, and ovary are normal. The foot glands are long and pyriform, being equal to the foot in length.

There is a clear retrocerebral sac, the duct of which can be traced to the outlets on the corona. The ganglion is large, and a small, round eyespot is situated near the posterior end.

Total length, 150 μ ; toes, 15 μ ; trophi, 20 μ .

HABITAT.—Submerged sphagnum in lofty acid-water associations.

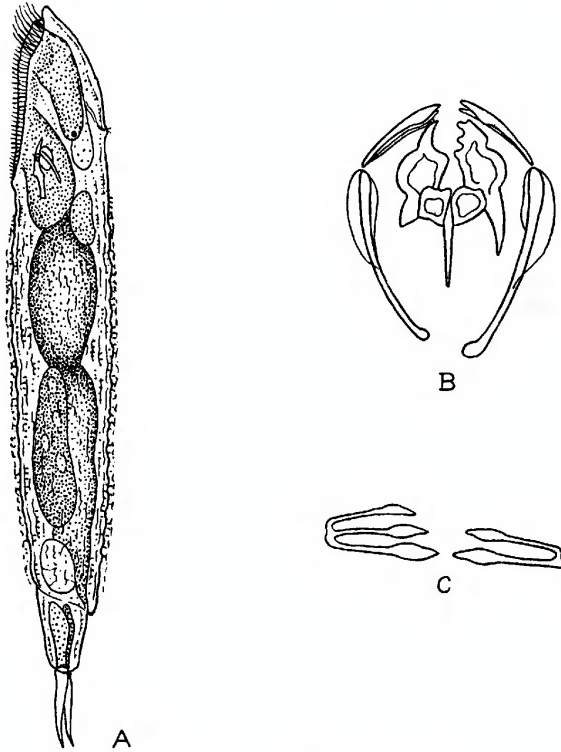


Fig 13. *Proales gladia*, new species.

A, lateral view; B, trophi, ventral view; C, unci, frontal view.

Proales gladia was found in small numbers in Jordan Mountain Pond, a small body of water (elevation about eleven hundred feet) situated directly above the ocean and lying between the summits of Sargent and Jordan mountains. The rotifer is sordid, its body being covered with fine particles of detritus adhering to a thin, mucilaginous investment. The prone corona, the characteristic alimentary tract, the sordid body, and the differences in the trophi separate this species readily enough from any other of the genus.

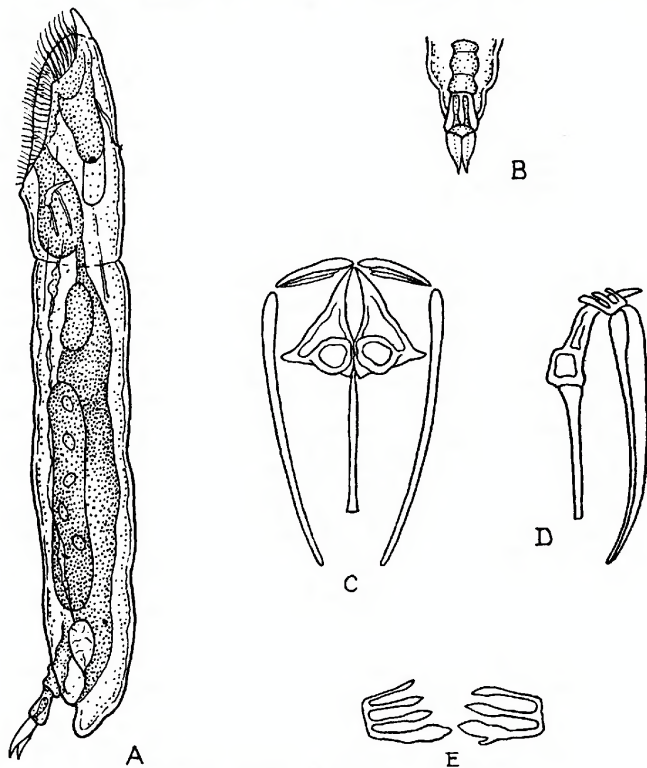
***Proales macrura*, new species**

Figure 14

The body is very long, parallel-sided, and cylindric. The integument is very flexible, and the outline is constantly changing with the contortions of the individual.

The head is long, being equal to about one-third of the total length of the animal. The abdomen is of the same depth throughout and ends in a prominent, overhanging tail.

The foot is ventrally placed; it is long, tubular, and has three well-marked joints. The toes are short and slightly undulate from the lateral view; from the ventral view they are swollen at the base, whence they diminish rapidly to fine recurved tips.

Fig. 14. *Proales macrura*, new species.

A, lateral view; B, foot and toes, ventral view; C, trophi, ventral view; D, trophi, lateral view, E, unci, frontal view.

The corona is nearly prone and agrees with that of the forcipate notommatis. There are prominent lateral tufts of cilia, adapted for locomotion and resembling auricles, but they are not evertile. The buccal field is large and evenly ciliated. The dorsal arc of the circumapical band has entirely disappeared, and the apical area is modified as a prominent rostral process. The mouth is near the ventral edge of the corona.

The dorsal and lateral antennae are very minute setigerous papillae in the normal positions.

The mastax is a modification of the malleate type. The fulcrum is a long, straight rod. The rami are triangular from the ventral view and have rather prominent basal apophyses. The right uncus has four, and the left uncus three stout well-developed teeth. The manubrium is very long; the dorsal branch is narrow and equals the median branch in length. There is no ventral branch.

The gastric glands are somewhat ventrally placed, and are large and reniform. The stomach and the clear intestine are not separated by a constriction. The ovary is large and elongate. The bladder is small and situated just behind the base of the foot. The foot glands are unusually small, being confined to the terminal foot joint.

There is a clear, ductless retrocerebral sac attached to the posterior end of the ganglion which encloses the small eyespot.

Total length, 149 μ ; toes, 9 μ ; trophi, 20 μ .

HABITAT.—Marginal sphagnum in acid-water brooks.

Proales macrura was collected in Duck Brook, Mount Desert Island and Cordroy Creek, Atlantic County, New Jersey. It is provisionally placed in the genus *Proales* on account of its modified malleate mastax and the position of the mouth opening. The corona of *Proales decepiens* Ehrenberg, also resembles that of the forcipate notommatids. The apical area of that species is not enclosed by the circumapical band, and the corona is oblique: it also has a retrocerebral sac. The posterior portion of the body of *Proales macrura*, the tail, and the ventrally placed foot are unlike those of any other species of the genus and suffice to identify it at once.

New species of other genera of the Notommatidae will be described in Part III of the 'Distribution of Rotifera on Mount Desert Island,' and will appear in American Museum Novitates, No. 630.

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